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Cash Flows and Market Risk

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Abstract

The theory of finance recognizes that the value of any asset is based upon the risk-adjusted present value of its expected future net cash flows. Recently Fama has modeled a multiperiod pricing process based upon the capital asset pricing model (CAPM). Based upon Fama's model, this research develops the rationale for using cash flows to explain the value and systematic risk of a firm. It presents a model of eight components underlying a firm's funds flows and hypothesizes how these affect systematic risk. Finally, this research measures and empirically analyzes the relationship between a firm's beta and levels, trends, and variability of these eight funds flow components.

CASH FLOWS AND MARKET RISK

The theory of finance recognizes that the value of any asset is based upon the risk-adjusted present value of its expected future net cash flows [5, 7, 14, 22, 23]. Financial theory also presumes that the goal of the firm is maximization of shareholder wealth. Therefore, the management of real assets is assumed to reflect the perspective of investors, who collectively determine the value of the firm.

The capital asset pricing model (CAPM), developed by Sharpe [20], Lintner [15] and Black [4] (SLB), currently lies in the main stream of financial management thought. Initially, the market equilibrium models of SLB and others were primarily concerned with one-period rates of return on a firm's common stock, where the length of the period was undefined. During its formative years the CAPM did not focus on a multiperiod stream of cash flows generated by a firm's investments nor the effect that an uncertain stream of cash flows would have on the price of a firm's securities. However, in 1977 Fama [10] modeled a multiperiod pricing process that utilized the SLB framework. The key contribution of Fama's article was that a firm's beta coefficient was related to the risks inherent in its cash flows. Fama showed that cash flows can vary in a multiperiod SLB model and that a single risk-adjusted discount rate can be applied to all flows [10, p. 4].

The Fama study provides the theoretical framework for further research on the relationship between the firm's beta coefficient and the risks of the cash flows generated by the firm's real assets. Several authors [1, 2, 3, 6, 9, 16, 17, 18, 19, 21] have attempted to identify

and measure the relationship between an ad hoc set of financial variables and beta. In general the findings have been mixed and inconclusive. The lack of explanatory power of the previous models occurs in part because a theoretical valuation framework was not properly specified and an ad hoc set of variables was used to test the model.

This study is based on the widely accepted theory that relates the value of the firm to its long run stream of net cash flows from real assets. The objectives of this paper are to develop the rationale for using cash flow information for explaining the value and market (systematic) risk of a firm; to present a model of eight components underlying a firm's funds flows; to present a set of scenarios that highlight classic funds flow patterns and hypothesize their effect on a firm's systematic risk; to measure empirically and analyze the relationship between a firm's beta coefficient and the eight funds flow components; and finally to summarize the implications of the empirical findings for financial management and planning.

WHY CASH FLOWS?

In 1937 John Burr Williams created the theory for valuing common stock [25]. Williams constructed the theory on the concept that the payment of cash dividends to investors for an endless time period was the basis of a common stock's value. Discounting the stream of cash payments to investors at the appropriate rate provided a solid theoretical base for determining the value of a firm's common stock.

In a related context, the present value of net cash flows from a capital investment is used to establish the acceptability of an investment project [5, 7, 14, 22, 23]. Although there are many simplifying

assumptions involved in estimating future cash inflows and outflows, financial economists recognize net cash flows are a basic component in determining the value of a capital investment and a common stock. The actual measurement of the cash flows rely on accrual accounting information.

As noted earlier, many empirical studies have attempted to discover the components underlying a firm's systematic risk or beta. The findings of the various studies ranged from mixed to inconclusive. One explanation for the mixed results is that the previous studies have not provided a theoretical framework that links market risk with a particular set of financial ratios. This study focuses on the relationship between the level of a firm's systematic risk and the relative size and variability of eight corporate funds flow components. Use of funds flows provides two distinct advantages. First, they are unambiguous components of a firm's market value. Second, they reflect the success management has experienced in controlling and directing the real assets of the firm.

In theory actual cash flow data would provide the best information to use in an empirical analysis of the determinates of a firm's market risk. Unfortunately actual cash flow data are not publicly available. The next best source of data are funds flows generated from balance sheet and income statement information. The model we have used to identify funds flow measures was developed in 1972 by Erich Helfert [12]. Helfert's model integrates balance sheet and income statement information and subdivides the funds flow variables into the three natural decision areas: investment, financing and operations.

The concept of funds flow analysis is designed to display movement of resources in financial terms. The funds flow statement measures the inflow of funds and tracks their outflows much like the traditional sources and uses of funds statements. By analyzing a company's chronological trends and patterns of funds flow, one can detect the various ways that management policies and decisions affect a company's financial performance. The funds statement can be used to compare the internal flow of resources among divisions or to compare differences and similarities of competitors. It can also be used to measure historical performance or alternatively, to evaluate the performance of alternative planning strategies from pro forma financial statements. In summary, a primary objective of funds flow analysis is to provide chronological benchmarks for measuring and judging management effectiveness [12, p. 4].

Helfert's funds flow statement integrates the sources and uses of funds from the balance sheet together with the inflow and outflow of funds from the income statement. Because the balance sheet reflects the measurement of assets and liabilities at a single point in time, to calculate the change in the movement of funds it is necessary to measure the change between time periods.

Although the changes in the balance sheet reflect major movements in the stock of assets and liabilities, there are also flow items that are required to have a complete picture of total sources and uses of funds within the firm. The major source of funds is net sales. Also interest and other income items received are sources of funds. The major outflow items are operating costs such as materials, supplies, labor, power and other cost items. Also variable and fixed overhead costs

represent a use of funds. Finally, interest, taxes, and dividends are outflows of funds that are integrated into the funds flow statement. Also the gain or loss in the sale of a fixed asset is included on the funds statement.

Helfert structured the funds statement to provide management with financial funds flow information that was categorized into three leading decision areas - operations, financing, and investment plus dividends. After extensive use of the Helfert funds flow analysis statement, we restructured and refined it into eight major components. The objectives of these modifications were to improve the organization of the funds flow information; to provide better diagnostic capabilities to management for analyzing the chronological movement of the inflows and outflows of funds; to expand the number of components in order to identify explicitly the one that is consistently a net inflow generator, the three that always result in a net outflow and the four swing components; to provide a tool for evaluating the affect of management strategies and policies on the allocation of resources; and finally, to introduce an integrated financial statement that provides information for measuring and judging the overall effectiveness of management.

The eight funds flow components are operating, working capital, financial, fixed coverage expenses, capital expenditures, dividends, other asset and liability flows and the change in cash and marketable securities. Five of the components are subdivided into inflows and outflows. They are operations, working capital, other assets and liabilities, financing and investment. A net flow is determined for each of these five components. The algebraic sum of these five components minus dividends

and net fixed coverage expenses will equal the change in cash and marketable securities. The revised format for the funds flow analysis and the acronyms for each variable are presented below.

Operating Flows
Inflows (OI)
minus: Outflows (OO)
equals: Net Operating Funds Flow (NOFF)

Working Capital Flows
Inflows (WCI)
minus: Outflows (WCO)
equals: Net Working Capital Funds Flows (NWCFF)

Other A&L Flows
Inflows (OA&LI)
minus: Outflows (OA&LO)
equals: Net Other A&L Funds Flow (NOA&LF)

Financial Flows
Inflows (FI)
minus: Outflows (FO)
equals: Net Financial Funds Flow (NFFF)

Investment Flows
Inflows (II)
minus: Outflows (IO)
equals: Net Investment Funds Flow (NIFF)

Dividend Outflows (DIV)

Fixed Coverage Expenditure Outflows (FCEF)

Change in Cash (CC) [Below: equals the sum of preceding seven components]

Beginning Cash and S.T. Investments

Ending Cash and S.T. Investments

REVISED MODEL

The funds flow components contained in the revised Helfert model are presented in equation 1. Because the interrelationship among the components is complex, equation (1) is presented in a format of a most likely case.

$$NOFF_t - NWCFF_t + NFFF_t - FCEF_t - NIFF_t - DIV_t \pm NOA\&LE_t \pm CC_t = 0 \ . \qquad (1)$$

Net operating funds flows (NOFF) are composed of all operating inflows (OI), of which sales is the primary source, minus all operating outflows (OO). The primary operating outflows are expenditures related to the cost of goods sold, selling and advertising taxes, research and development, rental, extraordinary, minority interest, deferred taxes, investment credit and tax loss carry forward. In summary,

$$NOFF_t = OI_t - OO_t \ , \qquad (2)$$

$$\text{where } OI_t > OO_t \ .$$

Normally, NOFFs are the primary source of funds inflow. However, seasonal and/or random events may cause NOFFs to be negative, which represents an outflow or a use of funds. Also declining market share or size of market, or internal operating inefficiencies may cause NOFFs to be negative. Equation (2a) illustrates a negative NOFF.

$$-NOFF = OI_t - OO_t, \qquad (2a)$$

$$\text{where } OI_t < OO_t$$

Net working capital funds flow (NWCFF) can be either a use or a source of funds. A net outflow of funds for working capital occurs when accounts receivable (AR) or inventories (INV) are increasing or when accounts payable (AP) are decreasing, or a combination of both. Under these conditions, NWCFFs are negative because they reflect an outflow of funds. Equation (3) presents the case of NWCFFs as an outflow in equation form:

$$-NWCFF = \Delta AP_t - \Delta AR_t - \Delta INV_t, \tag{3}$$

where

$$-\Delta AP_t = AP_t - AP_{t-1}, \text{ where } AP_t < AP_{t-1};$$
$$\Delta AR_t = AR_t - AR_{t-1}, \text{ where } AR_t > AR_{t-1};$$
$$\Delta INV_t = INV_t - INV_{t-1}, \text{ where } INV_t > INV_{t-1}.$$

Alternatively, when the level AR or INV are reduced or when AP are increased, or both, they represent an inflow of funds and the NWCFFs are positive, as shown in equation (4).

$$NWCFF = \Delta AP_t - \Delta AR_t - \Delta INV_t, \tag{4}$$
$$\Delta AP_t = AP_t - AP_{t-1}, \text{ where } AP_t > AP_{t-1};$$
$$-\Delta AR_t = AR_t - AR_{t-1}, \text{ where } AR_t < AR_{t-1};$$
$$-\Delta INV = INV_t - INV_{t-1}, \text{ where } INV_t < INV_{t-1}.$$

During a transition in current operations, management may change the level of AR, INV, and AP. Thus working capital funds provide management a buffer to adjust the funds flow in order to maintain an equilibrium condition between sources and uses.

If net investment flows (NIFF) are financed totally by operating funds, the firm does not need to utilize financial leverage. Equation (5) represents this condition, where NOFFs are the source of funds and NIFFs the uses.

$$NOFF_t = NIFF_t. \tag{5}$$

This condition reflects a firm in a strong competitive position, for example a firm that has a dominant share of a growing market. As an aid

in understanding equation (5), a graphic presentation is shown in Exhibit 1 as scenario 1. The NOFFs and NIFFs in scenario 1 are in-

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Insert Exhibits 1 and 2 here

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creasing over a five year period. The data in Exhibit 1, for scenario 1, are presented in Exhibit 2 as proportions of the total, e.g., NOFFs = 100% and NIFFs = 100%. Under these conditions it is hypothesized that a firm's market risk measure, beta, would be relatively low.

When a firm's internal operating funds are insufficient to meet the investment outflows, external debt, or equity, the major components of net financial funds flow (NFFF) may be sold to finance the shortfall in funds. When debt is utilized, interest is paid and defined as a fixed coverage expenditure flow (FCEF). Interest will always be an outflow (use) of funds, and usually NIFFs will be an outflow. Thus each has a negative sign in equation 1. When debt or equity are being increased, NFFFs are an inflow of funds (a source) which is reflected as a positive value in equation 1. This scenario is presented in equation (6) where the components on the left hand side (LHS) of the equation are sources of funds and the right hand side (RHS) are uses:[9]

$$NOFF_t + NFFF_t = NIFF_t + FCEF_t. \qquad (6)$$

Scenario 2 in Exhibits 1 and 2 portrays a graphic description of the mixed debt/equity strategy. Exhibit 2 clearly shows the presence of a 50/50 debt/equity strategy for scenario 2. We hypothesize a firm's

beta for strategy 2 will be greater than scenario 1 because financial risk was introduced through the sale of debt.

In Exhibits 1 and 2, scenario 3 depicts a firm that uses internal NOFFs to finance its investment in plant and equipment and working capital. Also NOFFs are used to pay dividends. In this example, NIFFs, NWCFFs, and DIVs reflect an outflow of funds (a use). Scenario 3 describes a firm with a strong debt/equity position. It is presented in equation (7) where the LHS represents the source of funds and the RHS contains the uses of funds,

$$NOFF_t = NIFF_t + NWCFF_t + DIV_t. \tag{7}$$

If dividend or working capital decisions create investor uncertainty in the stock market, the beta for scenario 3 will be higher than in scenario 1. Additionally, if the risk caused by dividend or working capital expenditures in scenario 3 is less than the financial risk created in scenario 2, the market beta will be lower in scenario 3, and, of course, vice versa.

When operating funds flow are relatively unstable, there can emerge investment and financing policies analogous to the scenario presented in scenario 4 in Exhibits 1 and 2. Equations (8a) and (8b) reflect a complex, mixed strategy illustrated, for example, in time periods 2 and 4, where the LHS is sources and the RHS is uses of funds:

$$NOFF_2 + NFFF_2 + CC_2 = NIFF_2 + NWCFF_2 + FCEF_2 + DIV_2 \tag{8a}$$

and

$$NOFF_4 + NWCFF_4 = DIV_4 + CC_4 + FCEF_4 + NFFF_4. \tag{8b}$$

Equation (8a) shows how management utilizes three major buffer accounts to adjust the flow of funds and maintain an equilibrium between sources and uses of funds. The three primary buffer accounts are NWCFFs, NFFFs, and change in cash and marketable securities (CC). Net other assets and liabilities (NOA&LF) is also a buffer component, but for simplicity it is not presented in Exhibits 1 and 2. In (8a) the CC is a source of funds and thus would have a positive sign in equation (1). However, in equation (8b), CC is a use of funds or an outflow, and would have a negative sign in equation (1). Also in equation (8a) NWCFFs are increasing and thereby using funds. However, in (8b), working capital provides funds along with NOFFs, which allows management to retire debt (NFFF). Exhibit 2 captures the subtle changes developed in scenario 4.

Equation (9a) illustrates how NFFF can be a source of funds and (9b) depicts NFFFs as a use of funds for retirement.

$$NFFF_t = STBF_t + LTBF_t + CSF_t, \tag{9a}$$

where

$STBF_t$ = an increase in short-term borrowing in period t;

LTBF = an increase in long-term borrowing;

CSF = an increase in common stock outstanding.

Any two of the above units could be zero and NFFFs would be positive if the third unit increased. However if any one of the units of NFFFs was negative and the others were zero, or if the algebraic sum of the three were negative, e.g., when debt or equity is retired, NFFF is negative as illustrated in equation (9b).

$$-NFFF = -STBF_t - LTBF_t + CS_t, \quad (9b)$$

where

-STBF = a decrease in short-term borrowing;

-LTBF = a decrease in long-term borrowing;

CS = an increase in common stock that is less than the sum of STBF and LTBF.

In scenario 5, found in Exhibits 1 and 2, we find a firm that has rapidly declining net operating flows over the five year period. In fact, NOFFs are negative in year 5. This rapid decline is primarily offset by financing flows, but also there is a reduction in cash and in net working capital to make up the remaining shortfall.

The outflow side of the scenario reflects a firm with declining investment, except in year 4, and rising fixed charges that are directly related to the increase in debt financing. The firm continues to pay dividends through year 3 even though net operating flows are declining.

Scenario 5 reflects a firm in a declining financial condition. Year 5 captures the worst case where NFFFs are the total source of funds and NOFFs are outflows. Equation (10) depicts year 5 in strategy 5.

$$NFFF_5 = NIFF_5 + NOFF_5 + FCEF_5 + NWCFF_5 \quad (10)$$

The fund scenario presents a firm that is experiencing a different form of financial decline. In scenario 6, the firm has a rapid deterioration of NOFFs and increasing reliance of NFFFs in year 2 and 3. In year 4 and 5 the sale of fixed assets is necessary to offset the outflow for operations and financing. This is a severe strategy because the firm

is forced to sell plant and equipment which is the economic base upon which operating flows are generated.

EMPIRICAL ANALYSIS

The objective of the empirical analysis is to test the relationship between a company's market risk (beta) and relative measures of each funds flow component. Before this is accomplished, there is a need to measure the level and trend of each funds flow series, because both measures contribute to the explanation of the behavior of the series [8]. Additionally there is substantial evidence that time series accounting data are either a random walk series or a random walk with a drift [13].

Data Sample

The 1980 Fortune 1000 manufacturing companies are the company population for the empirical analysis. These 1000 corporations were grouped into four quartiles of 250 companies, based upon the level of 1979 sales, e.g., the first group contained companies ranked 1-250 according to sales; the second group contained companies 251-500, the third and fourth groups were ranked 501-750 and 751-1000, respectively. From the first three sets of companies--(1-250), (251-500), and (501-750)--a sample of 30 companies per group were randomly selected for a total of 90 companies. From companies numbered 751-1000, only 24 companies met the designated sample criteria. There were 114 companies in the total sample.

The following criteria were used in selecting these 114 companies. Each company had to be on the COMPUSTAT Annual Industrial file and

contain complete annual financial statement data for the period 1969-1979. The monthly data for the period 1970-1979 had to be available on the monthly return tapes compiled by the Center for Research on Security Prices at the University of Chicago (CRSP). Finally, each company's fiscal year had to end on December 31. This last criterion allowed all betas and funds flow variables to be measured over the same period.

To provide an overview of the statistical results, Exhibit 3 presents a summary of the means and standard deviations for each of the

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Insert Exhibit 3 here
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eight funds flow components for the sample companies. Also the mean of the total flow, i.e., all sources and/or uses, divided by total asset ratio and the mean beta of the 114 companies are found in Exhibit 3. The data in Exhibit 3 show that net operating funds flow (NOFF) are the primary source of inflow. On average, NOFF contributes 67 percent of the total inflows, ±11.3 percent. On the outflow side, net investment funds flow (NIFF) was the largest component with 34 percent of the total, ±14 percent. Additionally, interest represents approximately 13 percent of the total outflow, ±7 percent, and dividends compose 12 percent, ±8 percent, of total outflows. The mean beta of the 114 companies was 1.27, ±.32.

There is a marked difference in the percentage contribution of each funds flow component when comparing the ten highest risk companies to the ten lowest risk companies from the sample of 114. The data for this comparison are presented in Exhibits 4 and 5. The companies are

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Insert Exhibits 4 and 5 here
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ranked in descending order of their respective beta coefficients. The mean beta for the ten companies with the highest risk was 1.87 compared to a beta of .75 for the ten lowest risk companies. The mean size of the ranking in the Fortune 1000 was 678 for the highest risk set and 348 for the lowest risk companies. The high risk companies contribute only 57 percent of total inflows from operations vis-a-vis 76 percent for the low risk companies. Net investment funds flow represented 32 percent of total outflows of the riskier companies, and 38 percent for the lower risk firms. The lower risk companies pay out 8 percent of total flows in interest compared to the 16 percent for the riskier companies. The opposite occurs with dividends. The ten highest risk companies pay out only 5 percent of total flows in dividends while the ten lowest risk companies distribute 21.7 percent of the total outflows in dividends. For both risk groups working capital was a user of funds, 8.7 percent of total outflow of highest risk set and 0.9 percent for lowest risk group. Finally, financing composed 1 percent of the total inflow for the lowest risk group and 3.7 percent for the highest cell.

Given the trends revealed in Exhibits 4 and 5, further investigation of the relationships between fund flow components and the level of systematic risk is warranted. Multiple regression is utilized to examine specific relationships. First, the relationship between the relative levels of the eight flow components given in equation (1) and market risk are tested. Next time series trends in the relative levels of the components are analyzed. Finally, variability measures of these flows are investigated.

The first phase of the study is given in equation (11).

$$\text{Beta}_i = b_0 + b_1\overline{TA}_i + b_2\overline{TF/TA}_i + b_3\overline{X}_{i,1} + b_4\overline{X}_{i,2} + b_5\overline{X}_{i,3} + b_6\overline{X}_{i,4} + b_7\overline{X}_{i,5} + b_8\overline{X}_{i,6} + b_9\overline{X}_{i,7} + b_{10}\overline{X}_{i,8} + \eta_i \qquad (11)$$

In (11), the following definitions are appropriate:

Beta_i = the ith company's market risk measure derived from the capital asset pricing model (CAPM). Beta_i equals $\text{cov}(i,m)/\sigma_m^2$ or the covariance between rate of return of the ith company's common stock and the return on the market, divided by the variance of market's return.

$\overline{TA}_i$ = the mean level of ending total assets for firm i during the 10 year study period;

$\overline{TF_i/TA_i}$ = the mean level of total flows (total sources or uses) relative to ending total assets for firm i, i.e.,

$$\overline{TF_i/TA_i} = \{(TF_{i,1}/TA_{i,1}) + (TF_{i,2}/TA_{i,2}) + \ldots + (TF_{i,10}/TA_{i,10})\} \div 10;$$

$\overline{X}_{i,1} = \overline{NOFF_i/TF_i} = \sum_{t=1}^{N} (NOFF_{i,t}/TF_{i,t})/N$ mean level of net operating funds flow for the ith company divided by total flow for the (N=10) period 1970-1979. Note that TF_{it} equals the total flow (i.e., funds sources) for firm i in period t; $NOFF_{it}$ is net operating funds flow for firm i during period t;

$\overline{X}_{i,2} = \overline{NWCFF_i/TF_i}$, the ith firm's mean level of net working capital funds flows relative to total flows, i.e.,

$$\overline{NWCFF_i/TF_i} = \{(NWCFF_{i,1}/TF_{i,1}) + (NWCFF_{i,2}/TF_{i,2}) + \ldots + (NWCFF_{i,10}/TF_{i,10}\} \div 10;$$

$\overline{X}_{i,3} = \overline{NOA\&LE_i/TF_i}$, the ith firm's mean level of other asset and liabilities funds flow relative to total flows, i.e.,

$$\overline{NOA\&LF_i/TF_i} = \{(NOA\&LF_{i,1}/TF_{i,1}) + (NOA\&LF_{i,2}/TF_{i,2}) + \ldots + (NOA\&LF_{i,10}/TF_{i,10})\} \div 10;$$

$\bar{X}_{i,4}$ = $\overline{NFFF_i/TF_i}$, the ith firm's mean level of net financial funds flow relative to total flows, i.e.,

$$\overline{NFFF_i/TF_i} = \{(NFFF_{i,1}/TF_{i,1}) + (NFFF_{i,2}/TF_{i,2}) + \ldots + (NFFF_{i,10}/TF_{i,10})\} \div 10;$$

$\bar{X}_{i,5}$ = $-\overline{NFEF_i/TF_i}$, the ith firm's mean level of fixed coverage expenses relative to total flows, i.e.,

$$\overline{NFEF_i/TF_i} = \{(NFEF_{i,1}/TF_{i,1}) + (NFEF_{i,2}/TF_{i,2}) + \ldots + (NFEF_{i,10}/TF_{i,10})\} \div 10;$$

$\bar{X}_{i,6}$ = $-\overline{NIFF_i/TF_i}$, the ith firm's mean level of net investment funds flow expenditures relative to total flows, i.e.,

$$\overline{NIFF_i/TF_i} = \{(NIFF_{i,1}/TF_{i,1}) + (NIFF_{i,2}/TF_{i,2}) + \ldots + (NIFF_{i,10}/TF_{i,10})\} \div 10;$$

$\bar{X}_{i,7}$ = $-\overline{DIV_i/TF_i}$, the ith firm's mean level of dividend outflows relative to total flows, i.e.,

$$\overline{DIV_i/TF_i} = \{(DIV_{i,1}/TF_{i,1}) + (DIV_{i,2}/TF_{i,2}) + \ldots + (DIV_{i,10}/TF_{i,10})\} \div 10;$$

$\bar{X}_{i,8}$ = $\overline{CC_i/TF_i}$, the ith firm's mean level of change in cash and marketable securities relative to total flows, i.e.,

$$\overline{CC_i/TF_i} = \{(CC_{i,1}/TF_{i,1}) + (CC_{i,2}/TF_{i,2}) + \ldots + (CC_{i,10}/TF_{i,10})\} \div 10; \text{ and}$$

η_i = the OLS error term for the ith company.

As seen in equation (11) two scale variables, average total assets and average total flow relative to ending total assets, were included. These two variables are included to capture the importance of asset size the productivity of those assets through the ratio of total flows/to total assets.

In testing equation (11) certain a priori relationships seem reasonable. For example, larger firms should have, other things equal, lower betas. Also firms with large operating funds flows and a major cushion of liquid assets should be less risky. In contrast, growth firm with low dividends and high capital expenditures would have higher betas. The same would be true of firms with large fixed coverage expenses and large levels of positive financial flows generated primarily through issuing debt. Unfortunately the relationships between other variables are somewhat ambiguous. Large working capital and other assets and liability flows might indicate strong growth potential and higher levels of systematic risk. However, if these buildups are indicative of inventory accumulation due to lack of consumer acceptance of a firm's products, a slowdown in growth might be indicated.

In performing the regression analysis outlined in (11), there arose a problem of statistical overidentification. In turn this problem raised questions regarding the a priori relationships between beta and various flow categories. The overidentification problem occurred because the sum of the relative flow components in any given year equal zero. Although the 10 year average flow proportions do not necessarily sum to zero, in the regression average source proportions are balanced against average use proportions. To prevent overidentification, one of the funds flow components is omitted from the regression. The excluded variable serves as an offsetting source or use against each of the remaining flow variables.

The results of the relative flow regressions are presented in Exhibit 6. The coefficients measure the effect each flow component has

on beta. That is an increase in a flow component is used to fund the

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Insert Exhibit 6 here

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balancing use component in each row, or vice versa. Because fixed coverage expenses, capital expenditures, and dividends are outflows, the sign of these coefficients are reversed.

Only the upper diagonal parameters are presented in Exhibit 6. Lower diagonal parameters would of course have the same value (with opposite sign) of their counterparts in the upper diagonals. As an example the coefficient (t-value) in the -DIVIDENDS row and the CC column would be -2.090 (-3.16). Also the coefficient (t-value) in the -CAPITAL EXPENDITURE row and CC column would be -.276 (.47). Following this procedure the coefficient rows (with opposite signs) can be rotated down to fill the appropriate columns.

For each regression in Exhibit 6 the intercept term, the coefficients of $\overline{TA}$ and $\overline{TF/TA}$, the adjusted R^2, and F-value are identical. The relative flow measures explain approximately one-third of the variation in the level of systematic risk. Both average total assets and the average ratio of total flows to total assets have negative coefficients. However neither is significant at the 5 percent level. As hypothesized, the NOFF column coefficients are negative, but only the trade-off between NOFF and DIV is statistically significant. The coefficients of the swing components, NWCFF and NOA&LF, coefficients vary in sign. As in the NOFF trade-off, only the DIV balancing flow is statistically significant. An analysis of the dividend row indicates that all coefficients except the fixed coverage outflow are significant at the 1 percent level. Most

of the signs of the coefficients in the dividend row are intuitively appealing. Whenever dividends are funded by operations or by reductions in working capital, other assets and liabilities or liquid assets, systematic risk falls. On the other hand when fixed coverage expenses or capital expenditures increase necessitating a reduction in dividends, systematic risk rises.

There are two unique trade-offs present in Exhibit 6. The parameters indicate when net financial inflows are used to finance dividends, systematic risk drops. In addition, when net financial funds flows are used to finance fixed coverage expenses, systematic risk also falls. Although these findings suggest financial irresponsibility, an alternative explanation seems plausible. Firms that use prudent amounts of financial leverage to increase the return on equity can also generate increased dividends. Although financial leverage should increase systematic risk, sustainable increase in dividends should reduce a firm's beta. The evidence in Exhibit 6 indicates that the trade-off between higher debt and larger dividend growth results in lower systematic risk.

The NFFF-FCEF trade-off is interesting, and at least two possible explanations exist. If a corporate borrower were to encounter a serious cash flow crisis its lenders might willingly restructure debt agreement. Exhibit 6 indicates that <u>if</u> lenders are willing to finance fixed coverage expenses, the level of systematic risk borne by shareholders will decline. An alternative explanation for the NFFF-FCEF effects on market risk might be attributed to the fact that the firms that use fixed-coupon long-term debt in an inflationary environment benefit when actual inflation exceeds expectations.

The second phase of the investigates the relationship between systematic risk and trends in the relative funds flow components over time. Trends in the X_i (i=1,...8) ratios, given in equation (11), were calculated using OLS regression techniques for the period 1970-1979. In these regressions the dependent variable was the relative flow component; time was the independent variable.

The structure of the trend model is given in equation (12).

$$Beta_i = b_0 + b_1\overline{TA}_i + b_2T_{TF/TA,i} + b_3T_{X_i,1} + b_4T_{X_i,2} + b_5T_{X_i,3} + b_6T_{X_i,4} + b_7T_{X_i,5} + b_8T_{X_i,6} + b_9T_{X_i,7} + b_{10}T_{X_i,8} + e_i \quad (12)$$

In (12) the T variables are trends of the appropriate flow components. The results of this phase of the analysis are given in Exhibit 7.

Insert Exhibit 7 here

The interpretation of the coefficients in Exhibit 7 is similar to those in Exhibit 6. However, instead of a pure sources/uses trade-off, the coefficients measure the impact upon systematic risk of downward or upward trends in sources and usages of funds flow proportions.

In Exhibit 7 the intercept as well as $T_{TF/TA,i}$ and $\overline{TA}_i$ coefficients were the same in each regression. However, unlike the levels analysis, average total asset size is negatively and significantly related to levels of systematic risk. The adjusted R^2 for the trend regressions is slightly below 20 percent, and the overall set of independent variables in these regressions is significant at the 5 percent level.

The majority of the coefficients in Exhibit 7 are positive. This implies the matching of an increasing trend in fund sources against an increase in funds usage trends to increase systematic risk. However, relatively few of these parameters are statistically different from zero. Trends in dividend policy have a high statistical association with levels of systematic risk. Based upon the signs of the coefficients in the dividend row, increasing trends in net operating flows that increase dividends will increase levels of systematic risk. The same would be true of all other funds flow category trends excepting cash and marketable securities.

The final phase of the empirical analysis investigates the role that variability in funds flow components play in determining levels of systematic risk. Two variability measures were used: the standard deviations of each flow category and the sum of the squared residuals obtained from the OLS trend regressions. The results of these regressions are reported in Exhibit 8. The standard deviation analysis indicates that

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Insert Exhibit 8 here

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only variability in net financing flows and dividends are statistically significant. In the OLS residual analysis average total assets and dividends are statistically significant at the 5 percent level. Net financing flows are significant at the 10 percent level. The adjusted R^2 values for the standard deviation and residual regressions are .271 and .226, respectively. The F-values for both regressions are significant at the 5 percent level. The negative relationship between dividend variability and systematic risk appears to be counterintuitive. However,

if firms attempt to follow a stable dividend policy, deviations from stable dividend growth trends should be relatively uncommon. Radical departures from an announced dividend policy could easily be caused by nonsystematic factors. A decline in the correlation between returns of the market and a firm's dividend policy might very well cause a firm's beta to drop.

The preceding analysis confirms the role that levels, trends, and variability in funds flows components separately play in affecting levels of systematic risk. However, a major question remains unanswered. Specifically, do various combinations of levels, trends, and variability add explanatory power when considered jointly. To answer this question, additional regressions utilizing the dividend balancing regression variables in Exhibits 6 and 7 in conjunction with residual variables in Exhibit 8 were undertaken. Based upon a F-test, it is possible to determine if the addition of a variable set adds statistically significant explanatory power to a regression model. Using the percent flow, dividend model from Exhibit 6 as a base for comparison, addition of neither the trend nor availability sets offers a statistically significant improvement in explanatory power. In addition, the inclusion of both trend and variability independent variables does not statistically improve the model's explanatory power. On this basis it appears that average levels of corporate cash and funds flows are more closely linked levels of systematic risk.

CONCLUSIONS

A model based on valuation theory was developed to explain the relationship between the level of a corporation's systematic risk and a

set of eight funds flow components. A set of statistical models measured the level, trend and variability of funds flow components as explanators of market risk. Several important observations emerged from the study. First, cash flow to shareholders in the form of dividends plays a major and statistically significant role in determining levels of systematic risk. This is true in terms of trends, levels, and variability. Regarding trends and variability measures, firm size appears to play an important role in explaining levels of beta; larger firms are less risky. Finally, levels of funds flows offer greater explanation when compared either with trends or variability measures.

REFERENCES

1. William Beaver, Paul Kettler and Myron Scholes, "The Association Between Market Determined and Accounting Determined Risk Measures," The Accounting Review, Vol. 45, No. 4 (October, 1970), pp. 654-682.

2. William Beaver and James Manegold, "The Association Between Market Determined and Accounting Determined Measures of Systematic Risk: Some Further Evidence," Journal of Financial and Quantitative Analysis, Vol. 10, No. 2 (June, 1975), pp. 231-284.

3. Uri Ben-Zion and Sol. S. Shalit, "Size, Leverage, and Dividend Record as Determinants of Equity Risk," Journal of Finance, Vol. 30, No. 4 (September, 1975), pp. 1015-10d26.

4. Fischer Black, "Capital Equilibrium with Restricted Borrowing," Journal of Business, Vol. 45 (July, 1972), pp. 444-454.

5. Richard Brealey and Stewart Myers, Principles of Corporate Finance, (New York: McGraw-Hill Book Company, 1981).

6. William J. Breen and Euguene M. Lerner, "Corporate Financial Strategies and Market Measures of Risk and Return," Journal of Finance, Vol. 28, No. 2 (May, 1973), pp. 339-351.

7. Eugene Brigham, Financial Management: Theory and Practice, Second Edition (Hinsdale, Il: Dryden Press, 1979).

8. K. H. Chan, J. C. Hayya and J. K. Ord, "A Note on Trend Removal: The Case of Polynomial Regression Versus Variate Differencing," Econometrica, April 1977, Vol. 45, p. 37.

9. Robert K. Eskew, "An Examination of the Association Between Accounting and Share Price Data in the Extractive Petroleum Industry," The Accounting Review, Vol. 50, No. 2 (April, 1975), pp. 316-324.

10. Eugene F. Fama, "Risk Adjusted Discount Rates and Capital Budgeting Under Uncertainty," Journal of Financial Economics, Vol. 5, No. 1 (August, 1977), pp. 3-24.

11. Myron Gordon, The Investment, Financing and Valuation of the Corporation, (Homewood, IL: Richard D. Irwin, 1962).

12. Erich A. Helfert, Techniques in Financial Analysis, Fourth Edition (Homewood: Richard D. Irwin, 1977), Chapter 1.

13. W. S. Hopwood and P. Newbold, "Time Series Analysis in Accounting: A Survey and Analysis of Recent Issues," Journal of Time Series Analysis, Vol. 1, No. 2, 1980, pp. 135-144.

14. Maurice Joy, Introduction to Financial Management, Revised Edition (Homewood: Richard D. Irwin, 1980).

15. John Lintner, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," Review of Economics and Statistics, Vol. 47, No. 1 (February, 1965), pp. 13-37.

16. Dennis E. Logue and Larry J. Merville, "Financial Policy and Market Expectations," Financial Management, Vol. 1, No. 2 (Summer, 1972), pp. 37-44.

17. Ronald W. Melicher, "Financial Factors Which Influence Beta Variations Within a Homogeneous Industry Environment," Journal of Financial and Quantitative Analysis, Vol. 9, No. 2 (March, 1974), pp. 231-241.

18. Ronald W. Melicher and David F. Rush, "Systematic Risk, Financial Data, and Bond Rating Relationships in a Regulated Industry Environment," Journal of Finance, Vol. 29, No. 2 (May, 1974), pp. 537-544.

19. Frank K. Reilly and James A. Gentry, "Relationships Between Changes in Market-Determined Risk and Changes in Finance and Accounting Variables," paper presented at Financial Management Association Meetings, Montreal, Canada, October 14, 1976.

20. William Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, Vol. 19, No. 3 (September, 1964), pp. 425-442.

21. Donald J. Thompson II, "Sources of Systematic Risk in Common Stocks," Journal of Business, Vol. 49, No. 2 (April, 1976), pp. 113-188.

22. James C. Van Horne, Financial Management and Policy, Fifth Edition (Englewood Cliffs: Prentice-Hall, Inc., 1980).

23. J. Fred Weston and Euguene F. Brigham, Managerial Finance, Sixth Edition (Hinsdale, Il.: Dryden Press, 1978).

24. Ronald F. Wippern, "A Note on the Equivalent Risk Class Assumption," Engineering Economist, (Spring, 1966), pp. 13-22.

25. John Burr Williams, The Theory of Investment Values, (New York: August M. Kelley, 1965).

EXHIBIT 1. FUNDS FLOW STRATEGIES AS MILLIONS OF DOLLARS OF INFLOWS AND OUTFLOWS

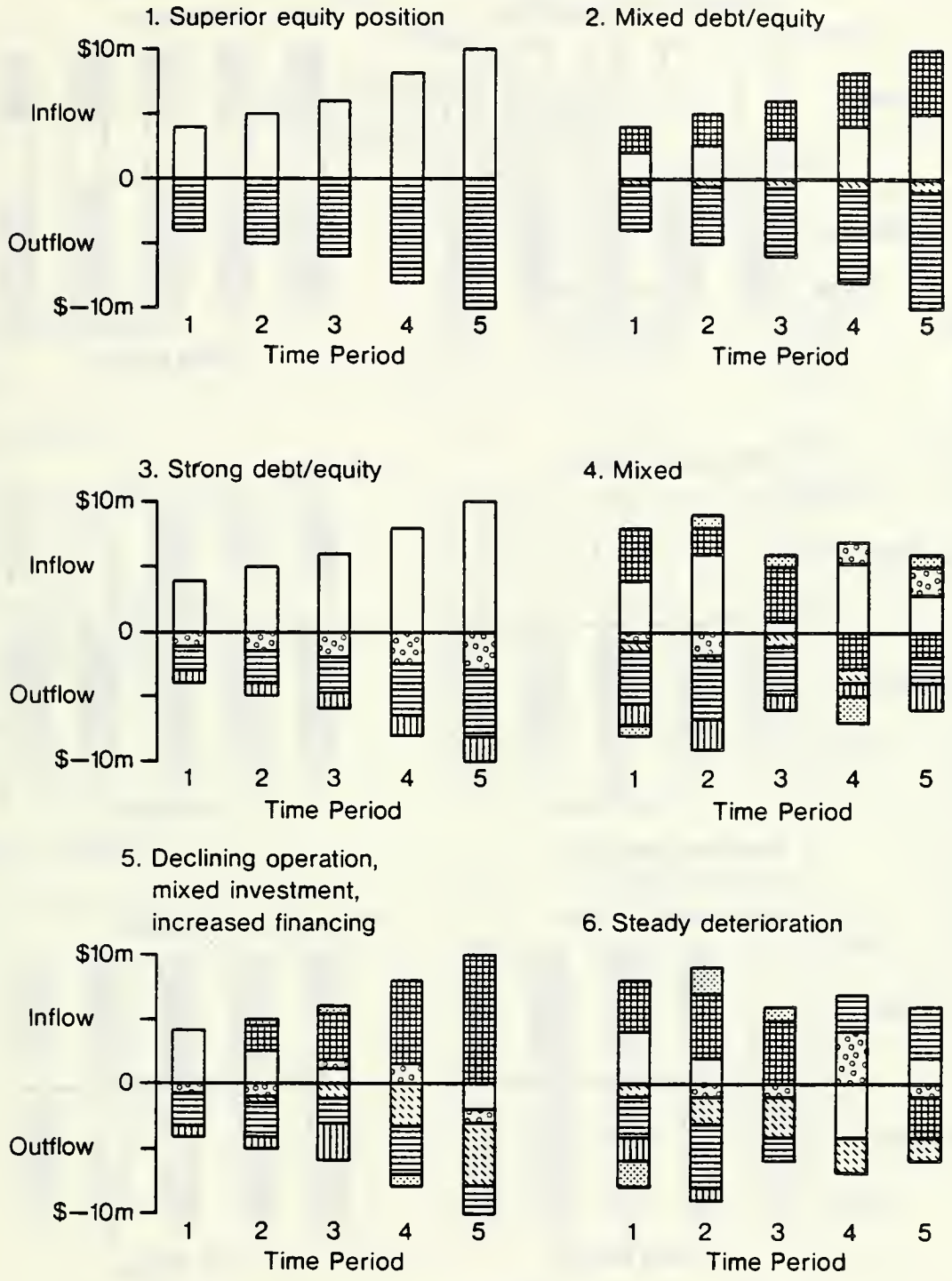

EXHIBIT 2. FUNDS FLOW STRATEGIES AS A PERCENTAGE OF INFLOWS AND OUTFLOWS

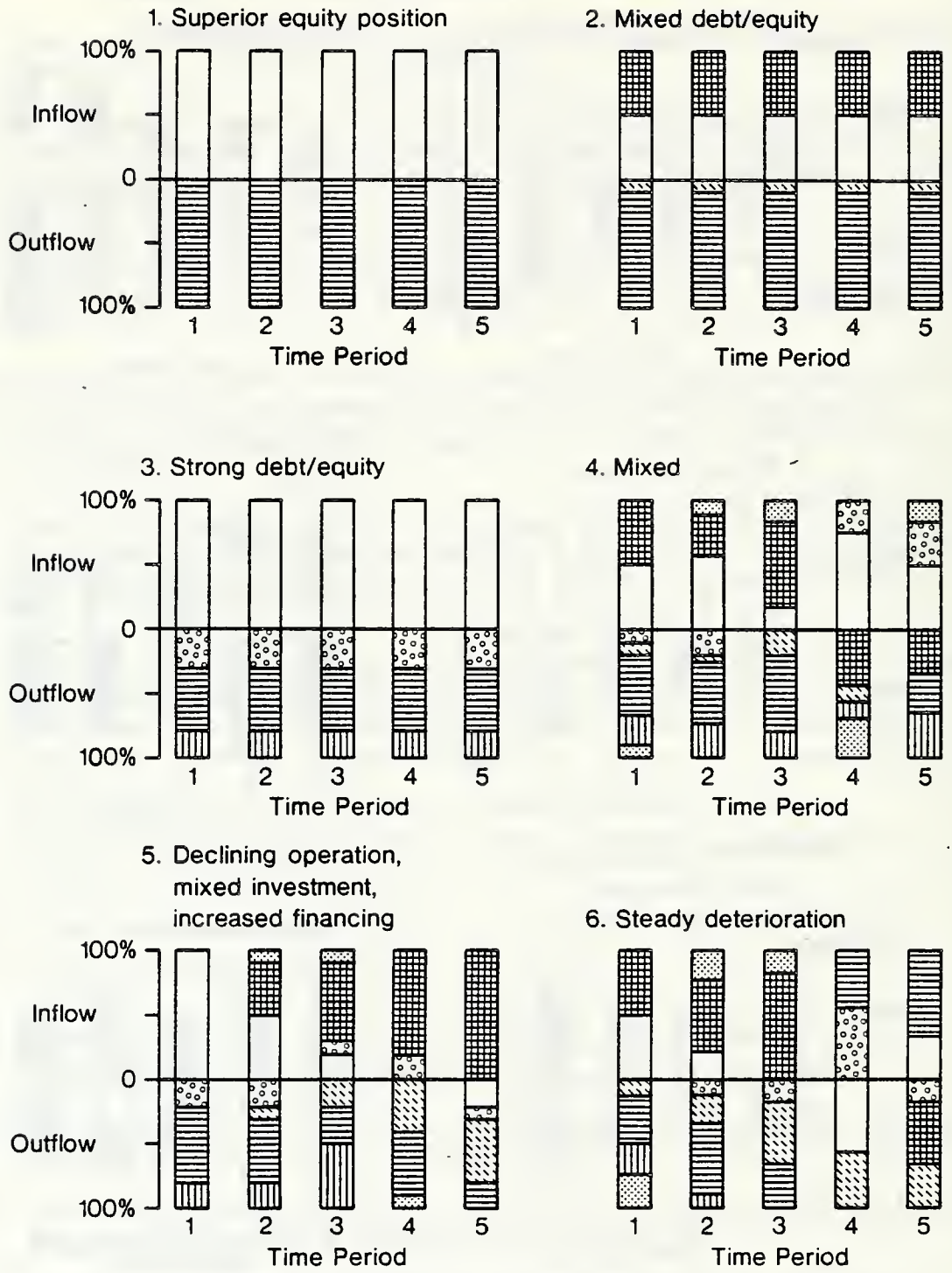

EXHIBIT 3

SUMMARY STATISTICS OF FUNDS FLOW MEASURES FOR 114 INDUSTRIAL COMPANIES, 1970-1979

	Percent of the Total Funds Flow			
The Flow Components	Mean	Standard Deviation	Minimum	Maximum
Operations	66.7	11.3	39.0	88.5
Working Capital	-7.4	10.3	-34.4	25.1
Other Assets & Liabilities	-1.7	5.3	-29.9	11.1
Financing	4.6	12.4	-36.2	30.5
Fixed Coverage Expenses	-12.8	7.0	-39.2	0
Capital Expenditures	-33.9	14.0	-70.9	-8.2
Dividends	-12.1	7.9	-55.9	0
Change in Cash	3.4	4.9	-7.9	20.6
Additional Measures				
Total Flow/Total Assets	18.9	4.8	8.8	43.0
Beta	1.27	31.6	.52	2.68

EXHIBIT 4

MEAN PERCENTAGE CONTRIBUTION OF EIGHT FUNDS FLOW
COMPONENT TO THE TOTAL FLOWS FOR
TEN HIGHEST SYSTEMATIC RISK COMPANIES, 1970-1979

Company	1980 Ranking in Fortune 1000	Beta	Mean Percentage of Total Flow Contributed by... (+ = Inflow; - = Outflow) NOFF	NFFC	NIFF	NWCFF	NOA&LE	FCEF	DIV	CC
Hazeltine Corp.	971	2.68	+55.5	- 7.7	-39.2	+ 8.4	+ 0.8	- 8.8	- 1.9	+ 7.6
Electronic Memories	887	2.00	+52.5	+ 3.7	-23.2	-14.6	+ 0.7	-12.2	- 6.8	- 0.1
Simmonds Precision Corp.	997	1.90	+56.5	-10.7	-16.9	-12.1	- 0.1	-10.8	- 4.2	+ 1.4
Publicker Industries	920	1.88	+40.8	+ 1.3	-37.2	+25.1	- 0.7	-32.4	- 1.4	- 4.1
Moore McCormack	468	1.82	+39.5	+ 8.7	-24.4	- 0.7	+ 1.9	-10.9	- 2.2	+11.9
Brunswick	242	1.77	+67.0	+ 2.2	-39.1	- 5.5	- 4.6	-13.1	- 6.1	+ 0.9
ATO Inc.	361	1.75	+69.4	+ 6.8	-28.5	-16.0	- 0.5	-24.8	- 7.9	- 1.5
Bard Inc.	745	1.70	+70.9	+ 7.0	-30.5	-32.7	- 0.7	- 2.7	-11.9	- 0.6
Oak Industries, Inc.	624	1.65	+59.6	-29.0	-45.7	-11.8	- 5.0	-15.1	- 7.1	+ 4.0
Itek Inc.	560	1.62	+54.6	+27.2	-36.9	-27.2	- 6.8	- 9.6	0.0	+ 1.4
Mean	678	1.87	+56.6	+ 1.0	-32.2	- 8.7	- 1.5	-14.0	- 5.0	+ 2.0

EXHIBIT 5

MEAN PERCENTAGE CONTRIBUTION OF EIGHT FUNDS FLOW
COMPONENT TO THE TOTAL FLOWS FOR
TEN LOWEST SYSTEMATIC RISK COMPANIES, 1970-1979

Company	1980 Ranking in Fortune 1000	Beta	Mean Percentage of Total Flow Contributed by ... (+ = Inflows; - = Ourflows) NOFF	NFFF	NIFF	NWCFF	NOA&LE	FCEF	DIV	CC
Kimberly Clark	162	.84	+80.2	+ 1.3	-44.5	+ 2.5	- 4.7	-10.0	-19.0	+ 3.6
Cone Mills Corp.	363	.83	+78.9	-12.9	-42.6	- 2.3	+ 0.5	-10.1	-10.8	+ 2.1
General Motors	2	.83	+78.0	+ 3.6	-46.9	+ 1.0	- 2.7	- 3.3	-23.2	+ 1.5
National Steel Corp.	76	.80	+64.4	+ 9.0	-48.6	- 1.9	- 4.5	-13.2	-13.2	+ 4.5
Ford Motor Co.	4	.78	+77.7	+ 3.2	-53.9	+ 0.6	- 3.2	- 7.2	-11.7	+ 7.6
Maytag Co.	521	.72	+88.6	- 0.3	-24.2	+ 1.8	- 0.0	0.0	-56.0	+ 4.3
Dentsply International	691	.70	+70.6	+16.4	-26.3	- 1.6	- 0.1	-13.2	-21.7	- 0.2
Standard Oil (Indiana)	10	.60	+82.7	+ 8.0	-70.9	+ 0.8	- 0.0	- 6.6	-14.1	+ 5.2
Conwood	903	.58	+76.0	- 1.5	- 6.1	- 4.7	- 1.4	- 6.1	-28.6	- 0.4
Amalgamated Sugar Co.	747	.52	+65.9	+10.5	-19.6	- 4.7	- 0.3	- 9.8	-18.9	+14.9
Mean	348	.75	+76.3	+ 3.7	-38.4	- 0.9	- 1.6	- 8.0	-21.7	+ 4.3

EXHIBIT 6

REGRESSION RESULTS FOR FUNDS FLOW COMPONENTS
β = f (Funds Flow/Total Flow Measures, where one represents a balancing source or use variable)

Balancing Flow	NOFF	NWCFF	NOA&LF	NFFF	-FCEF	-NIFF	-DIV	CC
ΔCash	-.376 (-.61)	.008 (.01)	-.046 (-.06)	-.176 (-.28)	.967 (1.52)	.276 (.47)	2.090 (3.16)	
-DIVIDENDS	-2.465 (-6.35)	-2.082 (-3.94)	-2.136 (-3.22)	-2.266 (-4.87)	-1.123 (-1.88)	-1.813 (-4.14)		
-CAPITAL EXPENDITURES	-.652 (-1.89)	-.269 (-.92)	-.323 (-.65)	-.453 (-1.89)	.609 (1.34)			
-FIXED COVERAGE EXPENSES	-1.342 (-1.93)	-.959 (-1.76)	-1.013 (-1.44)	-1.143 (2.07)				
NET FINANCIAL FLOWS	-.199 (-.54)	.184 (.66)	.130 (.262)					
NET OTHER ASSET & LIABILITIES FLOWS	-.329 (-.57)	.055 (.10)						
NET WORKING CAPITAL FLOWS	-.383 (-.93)							
NET OPERATING FLOWS								

*All t-values are given in parentheses. The critical t-values are 1,98 and 2.61 for the .05 and .01 levels, respectively. The following regression parameters and statistics were the same for each regression:

intercept	Total Assets	Total Funds Flow/Total Assets	$\bar{R}^2$	F
2.105 (7.11)	-.00002 (-1.94)	-.464 (-.80)	.322	6.95

REGRESSION RESULTS FOR TRENDS IN FLOW PROPORTIONS
β = f (Funds Flow Components, where one variable represents a balancing source or use variable)*

Balancing Flow	NOFF	NWCFF	NOA&LF	NFFF	-FCEF	-NIFF	-DIV	CC
ΔCASH	3.393	3.572	2.145	2.934	-.422	1.598	10.620	
	(1.86)	(1.92)	(.88)	(1.61)	(-.14)	(-.90)	(2.68)	
-DIVIDENDS	14.010	14.189	12.761	13.552	-11.038	-12.215		
	(4.13)	(3.61)	(3.12)	(3.58)	(-2.83)	(-3.18)		
-CAPITAL EXPENDITURES	1.795	1.974	.547	1.336	1.176			
	(1.36)	(1.30)	(.30)	(1.23)	(.42)			
-FIXED COVERAGE EXPENSES	2.970	3.149	1.722	2.511				
	(1.10)	(1.06)	(.60)	(.87)				
NET FINANCIAL FLOWS	.458	.637	-.789					
	(.37)	(.55)	(-.52)					
NET OTHER ASSET & LIABILITIES FLOWS	1.247	1.426						
	(.65)	(.77)						
NET WORKING CAPITAL FLOWS	-.179							
	(-.12)							
NET OPERATING FLOWS								

*All t-values are given in parentheses. The critical t-values are 1.98 and 2.61 for the .05 and .01 levels, respectively. The following regression parameters and statistics were the same for each regression:

intercept	$\frac{\text{Total Assets}}{}$	$T_{TF/TA}$	$\bar{R}^2$	F
1.317	-.00003	1.808	.192	3.98
(40.81)	(-3.05)	(.82)		

EXHIBIT 8

SYSTEMATIC RISK REGRESSION RESULTS FOR VARIABILITY MEASURES

	Volatility Measure	
	Standard Deviation	Sum of Squared Residuals from OLS Trend Analysis
Intercept	.908 (7.43)	1.176 (16.29)
Total Assets	-.00001 (-1.41)	-.00002 (2.09)
Variables Included in Volatility Analysis		
Total Flow / Total Assets	-.265 (-.61)	-.044 (-.06)
NOFF / Total Flow	.127 (.27)	-.793 (-.97)
NWCFF / Total Flow	.409 (1.08)	.852 (1.23)
NOA&L / Total Flow	.217 (.64)	.854 (.57)
NFFF / Total Flow	1.036 (2.91)	1.066 (1.98)
FCEF / Total Flow	-1.514 (-1.44)	-7.663 (-.74)
NIFF / Total Flow	.381 (1.03)	1.409 (1.22)
DIV / Total Flow	-3.461 (-2.92)	-57.275 (-3.35)
ΔC / Total Flow	.483 (1.49)	.657 (.97)
$\bar{R}^2$	.271	.226
F	.226	4.30

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